

**CLAIMS**

What is claimed is:

- 1 1. A nipple having an outer surface with at least two spaced circumferential  
2 grooves for affixedly receiving a generally cylindrical shell, wherein at least one of said at  
3 least two circumferential grooves is in abutting contact with at least one of an inside  
4 surface of said cylindrical shell, an end surface of said cylindrical shell, and an outside  
5 surface of said cylindrical shell.
- 1 2. A nipple having an outer surface with a plurality of spaced circumferential  
2 grooves for affixedly receiving an end portion of a generally cylindrical shell, wherein at  
3 least one of said plurality of circumferential grooves has a diameter less than an adjacent  
4 one of said plurality of circumferential grooves, said end portion being affixedly received  
5 in at least one of said plurality of circumferential grooves.
- 1 3. A nipple having an outer surface with a plurality of spaced circumferential  
2 grooves for affixedly receiving a generally cylindrical shell, wherein said generally  
3 cylindrical shell has one of a plurality of varying diameters, and is fixedly received in at  
4 least one predetermined one of said pluralities of grooves, said grooves being of  
5 successive increasing diameter relative to said generally cylindrical shell.
- 1 4. A permanently attached hose coupling, for a pressurized conduit end, having a  
2 generally tubular nipple and a generally cylindrical shell permanently attached to said  
3 nipple and generally surrounding said conduit end, said nipple having a longitudinal axis,  
4 a first end, a second end, a plurality of circumferential grooves located between said first

5 and said second ends, a bore extending from said first end to said second end, and an  
6 insert portion adjacent said plurality of grooves inserted into said conduit end;

7 wherein said grooves are dimensioned for affixedly receiving at least one  
8 of an inside surface, an end surface and an outside surface of said generally  
9 cylindrical shell; and

10 said grooves comprising:

11 a first groove with a generally flat base portion parallel with said  
12 longitudinal axis, a first substantially vertically oriented sidewall, and a second  
13 substantially vertically oriented sidewall having a maximum radial extent less  
14 than said first sidewall;

15 a second groove adjacent said first groove, with a generally flat base  
16 portion parallel with said longitudinal axis having a diameter less than said first  
17 groove base portion, a first substantially vertically oriented sidewall having a  
18 maximum radial extent similar to said first groove second sidewall, and a second  
19 substantially vertically oriented sidewall having a maximum radial extent less  
20 than said second groove first sidewall; and

21 a third groove adjacent said second groove, with a generally flat base  
22 portion parallel with said longitudinal axis having a diameter less than said second  
23 groove base portion, a first substantially vertically oriented sidewall having a  
24 maximum radial extent similar to said second groove second sidewall and a  
25 second substantially vertically oriented sidewall having a maximum radial extent  
26 greater than said third groove first sidewall.

1 5. The hose coupling as in claim 4 wherein said first groove second sidewall and  
2 said second groove second sidewall have a contoured top portion.

1 6. The hose coupling as in claim 4 wherein said first groove second sidewall and  
2 said second groove second sidewall have an angled top portion.

1 7. The hose coupling as in claim 4 wherein said insert portion has a plurality of  
2 spaced, circumferentially extending, frusto-conically shaped protrusions on the outer  
3 surface thereof.

1 8. The hose coupling as in claim 7 wherein one of said plurality of spaced  
2 protrusions is positioned approximately equidistant between said third groove and said  
3 second end and has a maximum radial extent greater than that of each of the others of  
4 said plurality of protrusions.

1 9. The hose coupling as in claim 4 wherein said generally flat base portion of each of  
2 said plurality of circumferential grooves has a series of surface disruptions along its  
3 circumference.

1 10. The hose coupling as in claim 4 wherein the outer surface of said third groove  
2 second substantially vertically oriented sidewall has threads for attachment with said  
3 generally cylindrical shell.

1 11. A permanently attached hose coupling, for a pressurized conduit end, having a  
2 generally tubular nipple and a generally cylindrical shell permanently attached to said  
3 nipple and generally surrounding said conduit end, said nipple having a longitudinal axis,  
4 a first end, a second end, a plurality of circumferential grooves located between said first

5 and said second ends, a bore extending from said first end to said second end, and an  
6 insert portion adjacent said plurality of grooves inserted into said conduit end;

7 wherein said grooves are dimensioned for affixedly receiving at least one  
8 of an inside surface, an end surface and an outside surface of said generally  
9 cylindrical shell; and

10 said grooves comprising:

11 a first groove with a generally flat base portion parallel with said  
12 longitudinal axis, a first substantially vertically oriented sidewall, and a second  
13 substantially vertically oriented sidewall having a maximum radial extent less  
14 than said first sidewall; and

15 a second groove adjacent said first groove, with a generally flat base  
16 portion parallel with said longitudinal axis having a diameter less than said first  
17 groove base portion, a first substantially vertically oriented sidewall having a  
18 maximum radial extent similar to said first groove second sidewall, and a second  
19 substantially vertically oriented sidewall having a maximum radial extent greater  
20 than said second groove first sidewall.

1 12. The hose coupling as in claim 11 wherein said insert portion has a plurality of  
2 spaced, circumferentially extending, frusto-conically shaped protrusions on the outer  
3 surface thereof.

1 13. The hose coupling as in claim 12 wherein one of said plurality of spaced  
2 protrusions is positioned approximately equidistant between said second groove and said  
3 second end and has a maximum radial extent greater than that of each of the others of  
4 said plurality of protrusions.

1 14. The hose coupling as in claim 11 wherein said generally cylindrical shell has a  
2 first end with an inwardly directed portion having an annular surface in an abutting  
3 relationship with one of said plurality of circumferential grooves for said permanent  
4 attachment.

1 15. The hose coupling as in claim 14 wherein said inwardly directed portion is located  
2 at the longitudinal inner end of said generally cylindrical shell.

1 16. The hose coupling as in claim 14 wherein said inwardly directed portion is located  
2 on the inside surface of said generally cylindrical shell.

1 17. The hose coupling as in claim 11 wherein said generally cylindrical shell has a  
2 first end and a second end, said first end having a turned-in portion generally directed  
3 towards said second end.

1 18. The hose coupling as in claim 17 wherein the outer surface of said turned-in  
2 portion is in affixed abutment with said second groove first sidewall.

1 19. The hose coupling as in claim 11 wherein the inside surface of said generally  
2 cylindrical shell affixedly abuts said first and said second sidewalls of said second  
3 groove.

1 20. A hose coupling having a generally tubular nipple for separate fixed attachment  
2 with one or more generally cylindrical shells, said nipple having a longitudinal axis, first  
3 and second ends, a series of circumferential grooves located between said first and said  
4 second ends, a longitudinal through bore, and an insert portion adjacent said series of  
5 grooves for insertion into said conduit;

6            wherein each of said series of circumferential grooves fixedly receives at  
7            least one of an inside surface, an end surface and an outside surface of said one or  
8            more generally cylindrical shells and each of said series of circumferential  
9            grooves has a base portion, a first substantially vertically oriented sidewall  
10           adjacent said base portion, and a second substantially vertically oriented sidewall,  
11           positioned adjacent said base portion on the side opposite of said first sidewall  
12           and has a maximum radial extent less than said first sidewall.

1    21.    The hose coupling as in claim 20 wherein said generally cylindrical shell has a  
2    first end with an inwardly directed portion having an annular surface in an abutting  
3    relationship with one of said at least two circumferential grooves for said permanent  
4    attachment.

1    22.    The hose coupling as in claim 21 wherein said inwardly directed portion is located  
2    at the longitudinal inner end of said generally cylindrical shell.

1    23.    The hose coupling as in claim 21 wherein said inwardly directed portion is located  
2    on the inside surface of said generally cylindrical shell.

1    24.    The hose coupling as in claim 20 wherein said generally cylindrical shell has a  
2    first end and a second end, said first end having a turned-in portion generally directed  
3    towards said second end.

1    25.    The hose coupling as in claim 24 wherein the outer surface of said turned-in  
2    portion is in affixed abutment with said first sidewall.

1 26. The hose coupling as in claim 20 wherein the inside surface of said generally  
2 cylindrical shell affixedly abuts said first and said second sidewalls.

1 27. A generally tubular nipple having a longitudinal axis, a first end, a second end, an  
2 outer surface with a plurality of circumferential grooves, located between said first and  
3 said second ends, for affixedly receiving a generally cylindrical shell, and a bore  
4 extending from said first end to said second end;

5 wherein said plurality of circumferential grooves are dimensioned for  
6 affixedly receiving at least one of an inside surface, an end surface and an outside  
7 surface of said generally cylindrical shell; and

8 said plurality of grooves comprising:

9 a first groove with a generally flat base portion parallel with said  
10 longitudinal axis, a first generally vertically oriented sidewall, and a second  
11 generally vertically oriented sidewall having a maximum radial extent less than  
12 said first sidewall;

13 a second groove adjacent said first groove, with a generally flat base  
14 portion parallel with said longitudinal axis having a diameter less than said first  
15 groove base portion, a first generally vertically oriented sidewall having a  
16 maximum radial extent substantially equal to said first groove second sidewall,  
17 and a second generally vertically oriented sidewall having a maximum radial  
18 extent less than said second groove first sidewall; and

19 a third groove adjacent said second groove, with a generally flat base  
20 portion parallel with said longitudinal axis having a diameter less than said second  
21 groove base portion, a first generally vertically oriented sidewall having a  
22 maximum radial extent substantially equal to said second groove second sidewall

23           and a second generally vertically oriented sidewall having a maximum radial  
24           extent greater than said third groove first sidewall.

1   28.    The generally tubular nipple as in claim 27 further including an insert portion  
2   located between said third groove and said second end and has a plurality of spaced,  
3   circumferentially extending, frusto-conically shaped protrusions on the outer surface  
4   thereof.

1   29.    The generally tubular nipple as in claim 27 wherein one of said plurality of spaced  
2   protrusions is positioned approximately equidistant between said third groove and said  
3   second end and has a maximum radial extent greater than that of each of the others of  
4   said plurality of protrusions.

1   30.    The generally tubular nipple as in claim 27 wherein said generally flat base  
2   portion of each of said plurality of circumferential grooves has a series of surface  
3   disruptions along its circumference.

1   31.    The generally tubular nipple as in claim 27 wherein the outer surface of said third  
2   groove second substantially vertically oriented sidewall has threads for attachment with  
3   said generally cylindrical shell.

1   32.    A generally tubular nipple having a longitudinal axis, a first end, a second end, an  
2   outer surface with at least two circumferential grooves located between said first and said  
3   second ends for affixedly receiving a generally cylindrical shell, and a bore extending  
4   from said first end to said second end;



5            wherein said at least two circumferential grooves are dimensioned for  
6            affixedly receiving at least one of an inside surface, an end surface and an outside  
7            surface of said generally cylindrical shell; and

8            said at least two circumferential grooves comprising:

9            a first groove with a generally flat base portion parallel with said  
10           longitudinal axis, a first generally vertically oriented sidewall, and a second  
11           generally vertically oriented sidewall having a maximum radial extent less than  
12           said first sidewall; and

13           a second groove adjacent said first groove, with a generally flat base  
14           portion parallel with said longitudinal axis having a diameter less than said first  
15           groove base portion, a first generally oriented sidewall having a maximum radial  
16           extent generally equal to said first groove second sidewall, and a second generally  
17           vertically oriented sidewall having a maximum radial extent greater than said  
18           second groove first sidewall.

1    33.    The generally tubular nipple as in claim 32 further including an insert portion  
2    located between said second groove and said second end and has a plurality of spaced,  
3    circumferentially extending, frusto-conically shaped protrusions on the outer surface  
4    thereof.

1    34.    The generally tubular nipple as in claim 33 wherein one of said plurality of spaced  
2    protrusions is positioned approximately equidistant between said second groove and said  
3    second end and has a maximum radial extent greater than that of each of the others of  
4    said plurality of protrusions.

1 35. The generally tubular nipple as in claim 32 wherein said generally flat base  
2 portion of each of said at least two circumferential grooves has a series of surface  
3 disruptions along its circumference.

1 36. The generally tubular nipple as in claim 32 wherein the outer surface of said  
2 second groove second substantially vertically oriented sidewall has threads for attachment  
3 with said generally cylindrical shell.

1 37. A generally tubular nipple having a longitudinal axis, a first end, a second end, an  
2 outer surface with a series of circumferential grooves located between said first and said  
3 second ends for affixedly receiving a generally cylindrical shell, and a bore extending  
4 from said first end to said second end;

5 wherein said series of circumferential grooves are dimensioned for  
6 affixedly receiving at least one of an inside surface, an end surface and an outside  
7 surface of said generally cylindrical shell; and

8 said series of grooves comprising:

9

10 a first groove with a generally flat base portion parallel with said  
11 longitudinal axis, a first substantially radially directed sidewall, and a second  
12 substantially radially directed sidewall;

13 a second groove adjacent said first groove, with a generally flat base  
14 portion parallel with said longitudinal axis having a diameter less than said first  
15 groove base portion, a first substantially radially directed sidewall, having a  
16 maximum radial extent generally equal to said first groove second sidewall, and a  
17 second substantially radially directed sidewall; and

18           a third groove adjacent said second groove, with a generally flat base  
19           portion parallel with said longitudinal axis having a diameter less than said second  
20           groove base portion, a first substantially radially directed sidewall, having a  
21           maximum radial extent generally equal to said second groove second sidewall,  
22           and a second substantially radially directed sidewall.

1    38.    The generally tubular nipple as in claim 37 wherein said first groove second  
2    sidewall and said second groove second sidewall have a contoured top portion.

1    39.    The generally tubular nipple as in claim 37 wherein said first groove second  
2    sidewall and said second groove second sidewall have an angled top portion.

1    40.    The generally tubular nipple as in claim 37 further including an insert portion  
2    located between said third groove and said second end and has a plurality of spaced,  
3    circumferentially extending, frusto-conically shaped protrusions on the outer surface  
4    thereof.

1    41.    The generally tubular nipple as in claim 40 wherein one of said plurality of spaced  
2    protrusions is positioned approximately equidistant between said third groove and said  
3    second end and has a maximum radial extent greater than that of each of the others of  
4    said plurality of protrusions.

1    42.    The generally tubular nipple as in claim 37 wherein said generally flat base  
2    portion of each of said series of circumferential grooves has a series of surface  
3    disruptions along its circumference.

1 43. The generally tubular nipple as in claim 37 wherein the outer surface of said third  
2 groove second substantially vertically oriented sidewall has a series of threads for  
3 attachment with said generally cylindrical shell.

1 44. A generally tubular nipple having a longitudinal axis, a first end, a second end, an  
2 outer surface with at least two circumferential grooves located between said first and said  
3 second ends for affixedly receiving a generally cylindrical shell, and a bore extending  
4 from said first end to said second end;

5 wherein said at least two circumferential grooves are dimensioned for  
6 affixedly receiving at least one of an inside surface, an end surface and an outside  
7 surface of said generally cylindrical shell; and

8 said at least two circumferential grooves comprising:

9 a first groove with a generally flat base portion parallel with said  
10 longitudinal axis, a first generally radially directed sidewall, and a second  
11 generally radially directed sidewall; and

12 a second groove adjacent said first groove, with a generally flat base  
13 portion parallel with said longitudinal axis having a diameter less than said first  
14 groove base portion, a first generally radially directed sidewall having a maximum  
15 radial extent substantially equal to said first groove second sidewall, and a second  
16 generally radially directed sidewall.